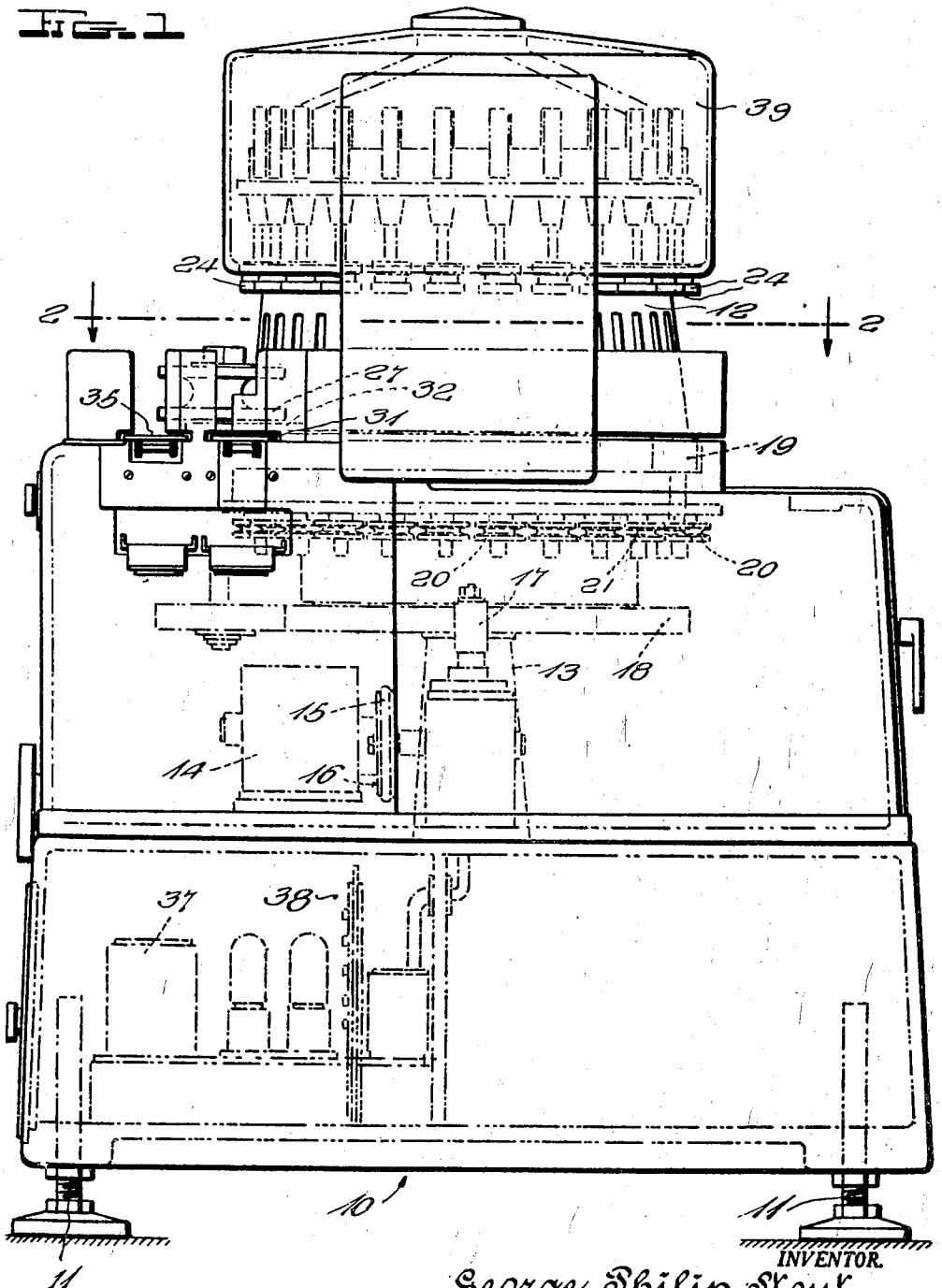
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METHOD OF IMPROVING MIX AND DRYING EXTERIORS OF BOTTLES

Original Filed Sept. 10, 1941 2 Sheets-Sheet 1

FIG. 1



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FIG. 2

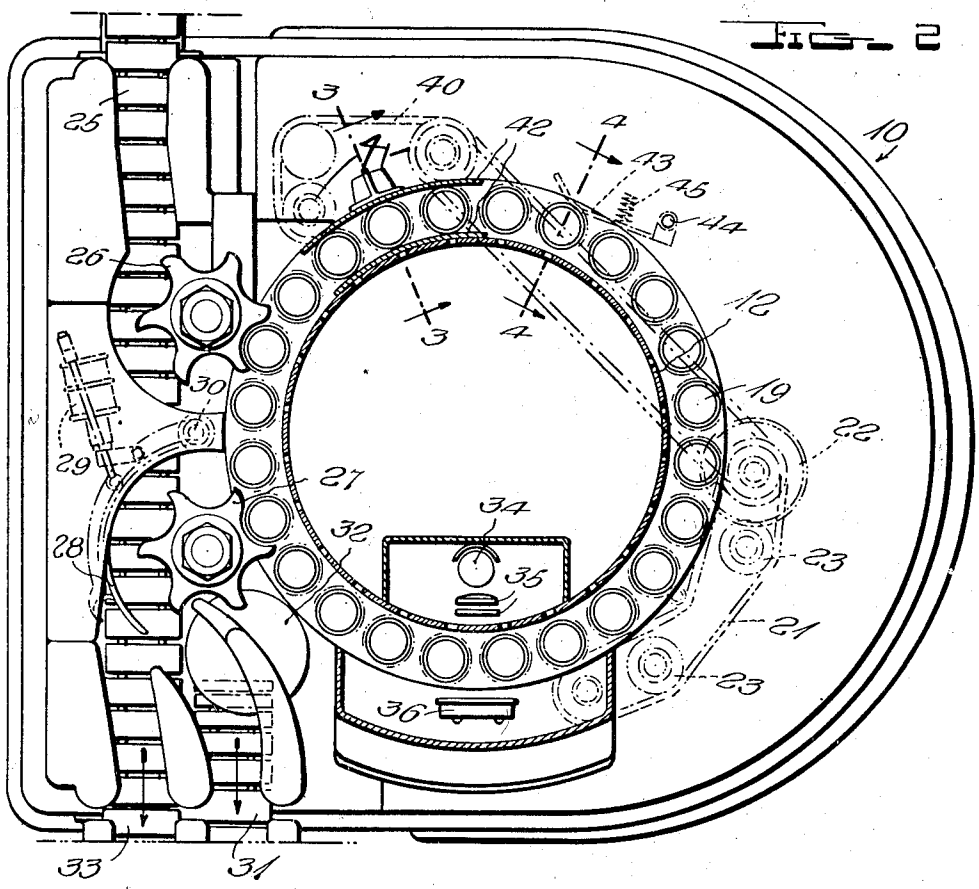


FIG. 3

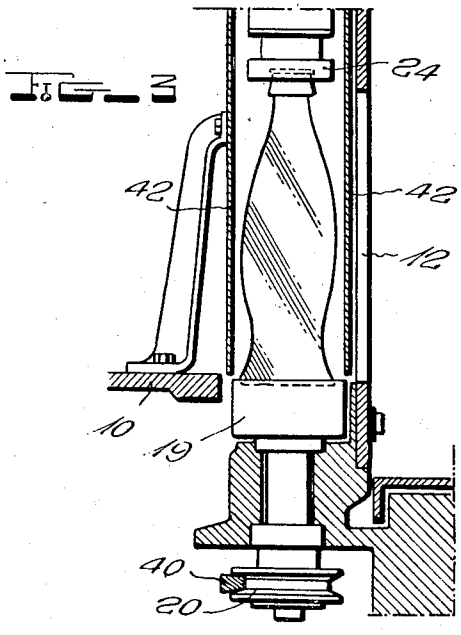
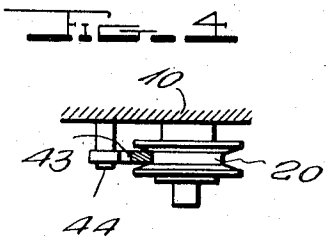


FIG. 4



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2,436,082

METHOD OF IMPROVING MIX AND DRYING EXTERIORS OF BOTTLES

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Original application September 10, 1941, Serial No. 410,315, now Patent No. 2,317,559, dated April 27, 1943. Divided and this application May 15, 1943, Serial No. 487,411

1 Claim. (Cl. 88—14)

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This application is a division of my co-pending application Serial No. 410,315, Method of detecting foreign ingredients in closed containers, filed September 10, 1941, Patent No. 2,317,559 issued April 27, 1943, and relating broadly to inspection devices.

In my basic Patent No. 2,132,447, is taught the detecting of foreign particles in bottled beverages or other containing means by passing a beam of radiant energy through the contents of such containers while said contents are being rapidly rotated, the bottles being abruptly stopped immediately before the inspection itself, and any interruption in said beam of light being picked up by a photoelectric cell and amplified, the impulse thus created then being used to cause a reject of the bottle containing the foreign ingredient.

It has been found that in certain bottling plants an inadequate mixing of the syrup with the carbonated water of certain soft drinks results in an unbalanced condition of the beverage at the time of inspection, this lack of uniformity setting up essentially the same reject conditions within the containers as those existing when a foreign ingredient is present, and resulting in bottles being thrown out which are unobjectionable except that the mixing of their contents is somewhat less than perfect. This situation naturally leads to considerable inconvenience and if carried to its ultimates, can result in the practical nullification of the inspection device, it being apparent that a high speed modern bottling plant cannot begin to operate when any appreciable portion of its production line is improperly diverted.

Also, bottles tend to get a greater or lesser amount of water on their exteriors during the bottling process, as for example, a certain amount of moisture adheres as the result of rinsing in the soaker during the last stage of cleaning, or a certain amount of water may accrue from the filling process as by leaking around the seal of the bell employed in directing carbonated water into the bottle. Occasionally, the contents of the container foam over and some of said contents adhere to the outside. It will also be noted that as bottles come from soakers, they are quite warm, and a lower temperature in the bottling room, plus the presence of any abnormal moisture there as for example that permeating from the steam and water used in the soaker or soakers; results in an appreciable condensation of water on the outside of the containers, which often achieve a frosted appearance under these

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conditions, all of which present additional problems as to inspection. A particularly troublesome manifestation of these may be visualized when considering the fact that the rotation of the containers tends to create a sort of "rain" in front of the photo cell equipment, which when fogged or obscured in this manner immediately enters upon a phase in which there exists a tendency to cause false rejects, this continuing until the optics and associated structure are wiped free from excess moisture. The foregoing problem is particularly acute in plants using what is known as a "Dixie" machine, where all bottles delivered have water on their exterior surfaces, and the extent of this problem is obvious when considering the fact that possibly fifty per cent of the smaller plants in the United States use this type of equipment.

An object of this invention is to provide a method of and means for improving the mix of the liquid contents of beverage containers, thereby insuring optimum inspection results.

Another object is to provide a method of and means for mixing the liquid contents of bottles, thereby improving their appearance and potability.

A still further object is to make possible automatic drying of bottles before inspection, thereby reducing false rejects heretofore caused by excess moisture at the point where the bottle comes into proximity with photo cell equipment.

Another object is to provide automatic drying means for bottles, thereby eliminating excess moisture and facilitating the general operation of the machinery involved.

Another object is to provide simplicity and economy of operation in a device of the instant type.

These and other objects are made apparent during the further progress of the present specification, a full and complete understanding of the invention involved being facilitated by reference to the drawings herein in which

Fig. 1 is a side elevational view of a beverage inspection device embodying my invention;

Fig. 2 is a horizontal sectional view taken substantially along the line 2—2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is an enlarged fragmentary side view, partially in vertical cross section, taken along the line 3—3 of Fig. 2, looking in the direction of the arrows; and

Fig. 4 is an enlarged fragmentary view of a certain brake structure taken along the line 4—4 of Fig. 2, looking in the direction of the arrows.

Referring now to the drawings, it will be seen that the instant beverage inspection device comprises a base and supporting structure 10 provided with adjustable legs 11. A turret-like member 12 is rotated about a base 13 by means of a motor or other source of power 14, operating through belt 15 to drive pulley 16 which in turn, through a conventional intermediate gear assembly, actuates pinion 17, the teeth of which engage and cause to revolve a large gear 18, same constituting in effect the lower peripheral edge of turret 12, and being fixedly mounted thereon.

Said turret 12 is provided with a series of rotatable bottle-receiving cups 19 (Fig. 2), to the lower portions of which are fixedly mounted pulleys 20, contemplated to engage driving belts 21 and thereby cause bottles to be rotated about their vertical axes. Belts 21 may be actuated by a second motor 22, idler and guide pulleys 23 serving to maintain said belts in such position that when elements 20 are brought into engagement therewith by virtue of the rotation of turret 12, the bottle-receiving cup members are quickly stepped up to a desired R. P. M.

At a pre-determined interval above each bottle-receiving cup and in perpendicular alignment therewith is a neck or top engaging element 24 (Fig. 3), same being free to rotate with or on a shaft and held against spring tension, a cam-like guide member automatically raising element 24 at the point where each bottle enters the turret, upon which said guide member becomes inoperative and the bottle is firmly held in position through the tension of a spring and associated elements, as is fully described in my said patent application Serial No. 410,315. Another and similar guide raises said top member as the bottle leaves the machine, thereby permitting it to continue its further progress without interruption.

A conveyor 25 brings bottles to the machine, an in-feed star wheel 26 governing this operation, and an out-feed star wheel 27 serving the opposite function at the other side of the device. A reject arm 28 is held in inoperative position by means of solenoid 29, spring means at pivot point 30 causing said arm to swing into the reject position shown in Fig. 2 upon said solenoid's becoming de-energized, and a reject conveyor 31, in conjunction with a revolving disc 32, directs rejected bottles to an accumulation table, where such containers may be picked up and disposed of as is indicated. Normally bottles proceed along infeed conveyor 33 in their progress towards channels of trade, but in the case of a foreign particle being present in any container, diversion automatically takes place in the foregoing manner. An optical system including a source of radiant energy such as bulb 34 is mounted in conjunction with turret 12 and through cam means synchronized with the clockwise movements of bottles in said turret, whereby during the inspection period both the optics and the bottle are travelling together in parallel relationship and without relative movement one to the other. Suitable lenses, suggested at 35 (Fig. 2), focus said beam of light upon a photo electric cell 36, selected impulses emanating therefrom being amplified and employed to cause a reject by de-energizing the solenoid 29 at the time a bottle containing a foreign ingredient is about to leave the machine, as set forth in detail heretofore.

The amplifier 37, switch relays, and associated equipment may be housed in the lower portion 38 of supporting member 10, and a suitable cover

such as 39, augments the appearance of the upper portion of the turret and also serves as a safety factor in enclosing moving parts contained in the upper section of the turret.

Special attention is now directed to the structure enabling bottles to be initially spun very rapidly, brought to a complete stop, and then accorded a normal optimum rotation during their further progress through the inspection system, this being accomplished through belt 40 driven by motor 22 which belt operates on idler pulleys 41 in such a manner as to engage driving pulleys 20 and give the bottles an initial spin of say 1½ times that of the regular spinning of such, or roughly, 2200 R. P. M. A conveniently located baffle 42 is employed to collect the water thrown off the bottles, and an automatic brake consisting of an arm 43 pivoted as at 44 and operating against the tension of a spring 45 then serves to bring the bottles to a stop.

Upon elements 20 contacting belt 21, bottles are again rotated, and may then either be abruptly stopped by a brake structure such as that suggested by 43—44—45, for example and brought into the optical field and inspected while the contents of the containers are still rotating; or inspected in keeping with the teachings of my said Patent No. 2,317,559, April 27, 1943; or otherwise inspected.

The method of mixing the contents of the bottles by rotating such rapidly and then abruptly stopping such rotation, serves to better mix said contents, and thus reduce false rejects; and at the same time removes moisture from the exterior of the containers, inspection not being entirely satisfactory in the presence of excess water, such causing drive belts to operate poorly, reducing the effectiveness of any brake, tending to oxidize and cause excessive wear on bearing surfaces, causing the bottles to slip in the cups, making it difficult to keep the "windows" clean through which is directed the beam of radiant energy during inspection, and generally causing a sort of "rain" in front of the photo cell equipment.

Extensive experimentation has developed the fact that there is a gradient in centrifugal drying of bottles, a drop of water on any particular point of the exterior surface being removed as the speed of rotation exceeds a certain value, the location of the water determining and marking this critical speed. For example, certain drops will remain on the bottle at 1200 R. P. M., which unfortunately is a desirable inspection speed—whereas the same drops will have been removed by the time they encounter a speed of 2000 R. P. M. By setting the speed of pre-spinning above the speed of the whirling for inspection, practically all of the water may be thereby eliminated, and greatly improved results in inspection thereby procured. Hence the desirability of first subjecting the container to the higher speed before entering upon the actual inspection process, is at once evident. The graph of water removal versus speed follows a logarithmic curve.

From the foregoing it will be apparent that I have disclosed a new and improved method of and apparatus for the inspection of bottled liquids which in its composite form represents advantages and improvements, the nature and extent of which it is believed have been adequately pointed out heretofore. While I have disclosed and described certain structure and procedure herein, I do not intend to limit myself thereby.

I claim:

The method of treating and inspecting a bottle and its content of freshly charged beverage mixture which comprises, rotating such bottle about its longitudinal axis at a speed of approximately 2000 R. P. M. to effect the removal of moisture from the exterior surface thereof and to bring about more thorough mixture of its contents, abruptly checking such rotation, again rotating such bottle about its longitudinal axis at a reduced speed of approximately 1200 R. P. M. and inspecting the bottle and contents by passing a beam of radiant energy therethrough while the bottle is rotating at such reduced speed.

GEORGE PHILIP STOUT.

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